

Development of Nutrient Criteria Recommendations for the Protection of Stream Aquatic Life
Technical Advisory Committee Meeting – November 25, 2013

MEETING NOTES

Agenda Item 1: Introductions / meeting objectives (Tom Wilton, Iowa DNR):

Wilton began the meeting at 9:30 a.m. Technical Advisory Committee (TAC) members and observers were asked to introduce themselves. TAC members present: Mike Burkart (Iowa State University), Connie Dou (Iowa DNR), Greg Gelwicks (Iowa DNR), Tom Isenhardt (Iowa State University), Chris Jones (Iowa Soybean Association), Steve Kalkhoff (U.S. Geological Survey), Mike Burkart (Iowa State University), John Olson (Iowa DNR), Clay Pierce (Iowa State University), Keith Schilling (Iowa DNR), Mary Skopec (Iowa DNR), Mark Tomer (USDA Agricultural Research Service), Tom Wilton (Iowa DNR). Not present: Mike Birmingham (State Hygienic Laboratory), Ed Brown (University of Northern Iowa), Peter Jacobson (Grinnell College), Kurt Pontasch (University of Northern Iowa), Gary Welker (U.S. Environmental Protection Agency).

Wilton stated that the purpose of the meeting was to allow the TAC to discuss the draft report (*Development of Nutrient Enrichment Criteria for Iowa Streams, draft report, August 23, 2013*). Wilton requested that the discussion be limited to TAC members and that if time remained at the end of the meeting, questions from the observers would be addressed.

Agenda Item 2: State nutrient reduction strategy (Adam Schnieders, Iowa DNR):

Schnieders described how Iowa's nutrient reduction strategy (NRS) fits into the nutrient criteria development effort, especially as is related to rules and water quality standards. He noted the overall progress in water quality improvement that has occurred over the last 50 years (e.g., no more rivers on fire) but that we still have WQ problems to address. He emphasized that the problem of nutrients will not be easy to address and that if the nutrient problem was an easy fix, it would have been fixed many years ago.

He explained how the issue of nutrient criteria doesn't fit the traditional Clean Water Act criteria development mold for the following reasons: (1) unclear cause/effect relationship; (2) the issue of whether one size fits all, and (3) the variety of different methods available for setting numeric nutrient criteria. He stated that the TAC will help define how nutrients impact water quality. He highlighted the issue of the cost to point sources of complying with very stringent water quality criteria. That is, permit limits are often set at the limit of treatment technology; thus, the treatment costs can be very high. He provided an estimate that complying with the typical numeric nutrient criteria (NNC) that exist today in the United States would be about \$5 billion for Iowa point sources.

Schnieders noted that there are many law suits regarding the slowness of states adopting numeric nutrient criteria. He said that Iowa is supporting EPA's denial of a petition from environmental groups to force EPA to complete a TMDL for the Mississippi River basin to address hypoxia in the Gulf of Mexico. He suggested that the work of the TAC will be useful in defending against law suits.

Two additional issues were mentioned: (1) How to translate numeric nutrient criteria into NPDES permit limits; (2) How Information from the TAC will affect the cost estimates. Schnieders noted that EPA is changing the way they are doing things. For example, with the new ammonia criteria recommendations, EPA is issuing a flexibility document because EPA knows that cities can't afford to meet these more stringent criteria. EPA's issuance of a flexibility document (keeping with the spirit of U.S. EPA's Stoner

memo from 2011) is another indicator that EPA is beginning to recognize the real-world impacts of establishing new or updated criteria to protect beneficial uses.

Schnieders stated that the NRS acknowledges that the road to numeric nutrient criteria is a slow one but the NRS is a way to get some nutrient reductions before and in addition to establishing criteria. For example, IDNR is issuing NPDES permits now with technology-based limits for nutrients. And, in this way, we can get some short-term nutrient load reductions. He added that he is seeing some positive results of the NRS on the NPS side as well. Understanding the science behind nutrient criteria is crucial.

Tom Isenhardt (Iowa State University) asked Schnieders a question about the NRS goal of a 45% reduction in nutrient loading. Schnieders recited the pertinent percentages of PS and NPS reductions needed to meet this goal. Wilton noted the difficulty of reconciling the issues of “loading” and “concentration”. For example, the time of the year when most of the nutrient loading occurs (high flows during spring and early summer) is different from the time of year when nutrient impacts in streams are expressed (base and low flows of late summer). Thus, there are challenges in looking at load reduction goals and nutrient impacts on aquatic communities using the same approach.

Agenda Item 3: Draft report conclusions and recommendations (Wilton):

PowerPoint Slide 3: Why are we here? Wilton restated the TAC’s mission established in 2010. He noted that between 2010 and 2013, much has happened; e.g., the Stoner memo and Iowa’s nutrient reduction strategy which notes the need to continue to work on numeric nutrient criteria. He stated that more work is needed by the TAC to look at Iowa-specific conditions and to look at the Iowa nutrient and biological data in order to determine where thresholds might be. He also noted that the decision was made in 2010 to have the TAC focus on nutrients as they impact aquatic life uses. Nutrient impacts on other uses (such as contact recreation and drinking water) are important and need to be addressed, but the focus of the TAC is on aquatic life protection.

PowerPoint Slide 4: Findings and Recommendations. Wilton noted that the report is a first draft and is “rough”, and that revisions need to be made. He further explained that a significant portion of the report is exploratory analysis (“warts and all”). Nonetheless, the hope is that the information in the report will lead to nutrient criteria recommendations.

Findings and recommendations from the report include the following: (1) wide-ranging nutrient conditions and responses occur in Iowa, and this variability presents challenges; (2) N & P relationships with biological responses are weak and that biological responses often appear to be related to other aspects of the aquatic ecosystem; (3) even though the relationships generally are weak, meaningful relationships were found in which nutrients adversely affect aquatic communities; and (4) other factors, for example, physical habitat, affect these (nutrient/biological) relationships. Other factors such as flow and light availability can often override the expression of nutrients as algal production.

PowerPoint Slide 5: Findings and Recommendations (continued): Wilton noted that the report makes recommendations for coldwater and Wadeable warmwater streams and that there remains a need to continue working on recommendations for headwater streams and for large (non-Wadeable) rivers. To that end, he noted that Iowa DNR is actively involved in data collection from both headwater streams and from large interior rivers in Iowa and that both chemical and biological data are being collected. One of the needs is to define the biological expectations for the very small streams and for the larger rivers in Iowa.

PowerPoint Slide 6: Nutrient Criteria Recommendations for Warmwater Streams: Wilton presented the information in the table on this slide and specifically mentioned the focus on total Kjeldahl nitrogen versus total nitrogen and the role of DO diel ranges in the criteria recommendations. He further

explained that DO minima are an important factor in identifying nutrient-related impacts to aquatic life but that (1) Iowa already has WQ standards for DO minima and (2) the existing WQ criteria correspond well with impact levels identified as part of the data analysis; thus, these criteria were not included in the summary of nutrient criteria recommendations. The season for applying the recommended criteria (June 15 to October 15) is the warmer time of year during base flow conditions when nutrient impacts are likely to occur. Wilton explained that the seston chlorophyll-a recommendation is graduated (scaled) by watershed size due to the likelihood that a 15 ug/l criterion would not fully protect against the occurrence of dissolved oxygen violations in small, wadeable streams.

PowerPoint Slide 7: Nutrient Criteria Recommendations for Coldwater Streams: Criteria recommendations for coldwater streams are to be applied during the same season (June 15-October 15). Regarding the recommendation for TKN versus total nitrogen (TN), Wilton explained TKN is composed of organic nitrogen and ammonia and that we (Iowa) have a long data record for TKN. He noted that EPA wants states to develop and adopt numeric nutrient criteria for total phosphorus and total nitrogen, and he further noted that there some issues (problems) with making criteria recommendations for TN. He also noted that he has received some comments regarding the use of TKN over TN. Wilton presented the information in the table of criteria recommendations on the slide with some additional explanation on the identification of the criteria recommendations for periphyton chlorophyll-a and for sediment chlorophyll-a.

PowerPoint Slide 8: Nutrient Monitoring and Assessment Guidelines: Wilton described how to go about monitoring and assessing the results to identify nutrient impacts. He explained that, although the report recommendations regarding monitoring and assessment may change, Iowa DNR's work on stressor identification for biological impairments provides the experience and expertise behind these recommendations. He noted that the recommendations address the seasons, parameters, and numbers of samples needed for nutrient assessment. He explained that it is difficult to develop NNC for phosphorus and nitrogen that can stand alone because the analysis of Iowa stream data showed they are inaccurate predictors of biological responses linked to aquatic life use impairments. Thus, bio-confirmation—which has recently been endorsed by EPA—is an important part of the nutrient assessment process. The intent of bio-confirmation is not to replace NNC but to use the nutrient response variables in conjunction with biological data to confirm that nutrient impacts exist.

PowerPoint Slide 9: Implementation of Recommendations: Wilton described the main recommendations contained in the report. The first recommendation is that Iowa DNR could implement the recommended criteria framework into the 305(b)/303(d) process (i.e., into Iowa's 305(b)/303(d) assessment/listing methodology) to determine whether nutrients are playing a role in aquatic life impairments identified through biological (fish and macroinvertebrate) monitoring. Admittedly, the nutrient criteria recommendations are not yet at the level of numeric nutrient criteria, but implementation in this way would allow incorporation of the criteria recommendations into the 305(b)/303(d) process. This implementation would only be for the wadeable warmwater and coldwater streams, although biological and nutrient monitoring of headwater streams and large rivers needs to continue. Another recommendation is to incorporate nutrient impact monitoring into the nutrient reduction strategy, possibly in priority watersheds identified as part of the strategy. The implementation process is dependent on the continued involvement of TAC members and the feedback from the TAC. Wilton sees the ongoing need to periodically update the technical report.

Agenda Item 4: Summary of Comments Received to Date (Wilton):

PowerPoint Slide 10: TAC comments received to-date by category: Wilton reviewed comments received regarding the expansion of water quality standards (i.e., how this (TAC) nutrient criteria effort relates to other designated uses) and regarding the need to provide citations for statements made in the draft

technical report. There was a suggestion to include nitrate toxicity studies. One reviewer suggested looking at studies conducted in other areas of the United States or globally with lower levels of nutrients.

Regarding the criteria framework and implementation, the comments received seem to indicate concern with implementing the framework; e.g., comments have been received regarding the seasonal application of the criteria.

Regarding data analysis, comments have been received that question the interpretations in the draft report of some nutrient responses; e.g., comments concerning the expected relationship between nitrate-nitrogen and chlorophyll A.

PowerPoint Slide 11: TAC comments received to-date by category (continued): Wilton reviewed comments received on (1) data representativeness, (2) nitrogen (e.g., that nitrate toxicity should be included in the framework, that TKN is not an appropriate variable, that criteria recommendations should include ammonia and nitrate), (3) the need for two separate reviews of the report - one scientific and one non-technical, (4) sample analysis methods (i.e., a request to specify sample analytical methods, and (5) on the scope of work and data analysis.

[Break for ~ 10 minutes]

Agenda Item 5: Additional comments and open discussion (Technical Advisory Committee):

Wilton asked the TAC for additional comments and discussion about the draft report and criteria recommendations. He reiterated that, time permitting, comments would be received from meeting observers after the TAC discussion had ended.

Clay Pierce (Iowa State University): Noted that the report was a huge effort and that the data analysis was well-done, sophisticated, and elegant, but, he suggested that the nutrient criteria development issue could be approached as a multivariate problem, and he mentioned Dave Roe's work (with which Wilton was involved) as an example of such a multivariate analysis. Pierce then asked whether there was place in the nutrient criteria data analysis for multivariate analysis to, for example, remove the effects of habitat in order to focus on, and explore relationships in, the residual variability. Wilton responded that this type of analysis (multivariate) was suggested early in the nutrient criteria development process. He added that such an approach was "daunting" without first looking at how nutrients and aquatic life are related. Wilton said that a multivariate analysis might, however, help explain the wide range of responses to nutrients across the state and that he sees value in such an analysis. He added that it might be more difficult to arrive at threshold values using a multivariate approach. He is, however, open to the idea of such an approach in the interest of improving the report.

Keith Schilling (Iowa DNR) noted that the statistical relationships noted in the report "were not all that good". He asked whether the collection of additional data might help improve the understanding of these relationships. Schilling remarked that part of the problem is that often these types of data analysis projects are conducted on big data sets that were not designed to answer specific questions. Wilton agreed that additional targeted monitoring might be useful, and he noted that this type of monitoring was done in Illinois to get at stream nutrient response relationships (see Czapar 2007: *Illinois Council for Agriculture and Research (CFAR) Final Report of the Strategic*

Research Initiative in Water Quality). When Schilling asked what might be done, Wilton responded that the monitoring design for such a project is crucial and that the typical multi-objective approaches to monitoring (e.g., ambient chemical or biological monitoring) wouldn't likely supply the information needed. He suggested that the nutrient relationship-specific monitoring might be appropriate in a priority watershed identified through Iowa's nutrient reduction strategy. Mary Skopec (Iowa DNR) agreed that projects such as Iowa's REMAP project provide useful information but that such a "one and done" approach does not provide a full picture of, for example, nutrient impacts to the aquatic biota. Wilton agreed and added that IDNR's stressor identification work has tried to address this issue; i.e., used monitoring specifically designed to provide the data needed to investigate nutrients and other stressors as potential causes of aquatic life use impairment. Wilton said that he would look at the report recommendations concerning monitoring and will consider what additional monitoring might be useful, and he invited Schilling to also provide monitoring recommendations. Schilling emphasized that additional monitoring might also allow improvement in the recommended nutrient benchmarks. Skopec noted that there are other data available that might be added into the nutrient criteria analysis; e.g., the EPA/USGS joint Midwestern Stream-Quality Assessment (MSQA) project that includes intensified monitoring for nutrients and other water quality parameters in Iowa and other Midwestern states. Wilton agreed that this project could be helpful, and noted that we need to know the specific questions to ask before additional monitoring is conducted. He added that we (Iowa DNR) already have sufficient data on physical habitat to attempt the type of multivariate analysis that Clay Pierce suggested. Pierce offered that the quantile regression and regression tree analysis methods utilized in change-point/threshold analysis could also accommodate multivariate data.

Tom Isenhardt (Iowa State University) agreed with Pierce and Schilling regarding data analysis and additional data collection, and he agreed that such additional monitoring could be conducted in the priority watersheds of the Nutrient Reduction Strategy. He asked Wilton what data might be needed to better understand the conceptual pathways identified in the nutrient criteria report. After Wilton put Figure 1 from the draft report on the screen (*Conceptual model diagram of nutrient stressor pathways leading to impairment of aquatic biological communities*), Isenhardt asked what do we need to work on and where? Wilton responded that one area that needs work is the role of the release of nutrients from stream sediments and how this influences algal production. There is nothing in the existing data that addresses this issue. Wilton added that some research had been done in Illinois and that maybe Iowa could pattern studies based on the experience in Illinois. Wilton offered that another area that has a weak relationship and that needs further work is the connection between benthic algae and nutrient levels in the water column. For example, higher nitrogen levels have been found in the presence of more benthic algae whereas the expectation would be that the algae would, through nutrient uptake, lower nitrogen levels. Wilton added that nutrient patterns in Iowa don't match well with those observed across the U.S., such as the patterns responses described by Walter Dodds in Kansas (e.g., *Dodds, W.K. Eutrophication and trophic state in rivers and streams*).

Mary Skopec questioned the use of TKN in implementing the nutrient assessment recommendation. She stated that EPA doesn't like the TKN method and it will probably be going away because of the chemicals used in the analysis. Thus, Skopec suggested use of total nitrogen (TN) instead of TKN. Wilton responded that TKN was included in the recommendations because it was the nitrogen parameter that was most consistently related with nutrient response variables. Skopec stated that long-term use of TKN for assessing nutrient impacts and identifying nutrient impairments may present a problem. Wilton remarked there is ambiguity about what TKN represents and that he is uncomfortable referring to TKN as a causal variable. Mike Burkart (Iowa State University)

commented that TKN is a laboratory analysis parameter. Wilton agreed and added that it includes both organically-bound nitrogen plus ammonia nitrogen and the analysis doesn't tell how much N is bioavailable. Schilling asked what portion of TKN is total nitrogen and about the possibility of scaling-up from TKN to TN. Skopec replied that the proportion varies considerably. Wilton agreed and noted that TN is mostly comprised of dissolved inorganic nitrogen, particularly nitrate-nitrogen. Wilton added that ammonia nitrogen is usually not detected in stream samples, noting that ammonia levels were below detection (i.e., 0.05 mg/L) in more than 75% of the samples analyzed for the REMAP project.

Steve Kalkhoff (USGS, Iowa City) mentioned that we don't know the source of the organic nitrogen in TKN and that the source could be in-stream. Wilton agreed and added that it might be the oxygen-demanding portion of TKN that is important with respect to adverse impacts on biota, and this demand may have been produced in the stream or come from watershed sources like wastewater discharges or runoff of animal waste. Tom Isenhardt added that if the organic nitrogen is produced in the stream, this will confound the relationship with the response variable. Wilton said that he views TKN as an indicator of trophic state and not necessarily as an indicator of bioavailable of nitrogen. He added that Minnesota has added a BOD indicator to their stream/river eutrophication criteria as a response variable, which is somewhat similar to our (Iowa DNR) use of TKN in the proposed nutrient criteria recommendations.

Mike Burkart asked why a whole category of response is not included in the analysis; that is, toxicity. He stated that this is unsatisfactory and asked about the rationale for why the report does not address ammonia and nitrate toxicity. Burkart questioned what good will it do to set criteria to protect against long-term nutrient effects when short-term lethal effects to the aquatic community are not dealt with? Also, he commented that there is insufficient characterization of aquatic life in the draft report. Burkart said that having a better characterization of aquatic life would allow a better understanding of what the criteria should be.

Regarding the inclusion of toxicity in Iowa's nutrient criteria development, Wilton responded that the EPA-recommended approach for developing numeric nutrient criteria was used for this effort and that EPA's main thrust is for states to look at non-toxic responses and at eutrophication issues. In other words, the EPA focus is on the water quality impacts that occur due to the translation from nutrients to algae and other organic matter. This was the focus of the nutrient criteria development process outlined in the draft report. Wilton added that there is room for attention to aquatic toxicity issues such as with nitrate, but that he feels that the issue of toxicity would confuse the issue of eutrophication. Wilton suggested that any effort to develop WQ criteria based on the toxicity of nitrate to aquatic life should be handled through the traditional WQ standards development process as used for other toxic substances (e.g., ammonia). Mark Tomer (USDA-ARS) asked whether the draft nutrient criteria recommendations only consider chronic impacts. Wilton remarked that while there can be chronic toxicity concerns related to nutrient over-enrichment, long-term eutrophication impacts on the aquatic community have traditionally been the primary focus of nutrient criteria development.

Mike Burkart continued that if we have chronically toxic conditions in our streams, we won't be protecting aquatic diversity. Further, if we don't allow embryo (larval) stages of macroinvertebrates to exist due to chronic toxicity, we will see these impacts. Thus, we need to include nitrate toxicity into the nutrient criteria development process. Burkart referred to the inclusion of nitrate toxicity as "low hanging fruit." He added that aquatic organisms aren't killed by TKN. Connie Dou (Iowa DNR) responded to Burkart's statements on toxicity issues by stating that (1) we (Iowa DNR) already have a separate process and method for developing WQ criteria for toxic parameters, (2) that we

already have water quality criteria for ammonia and (3) that we continue to revise these criteria for toxics as new information becomes available. She added that Minnesota is the only state that is currently looking at nitrate toxicity and that EPA does not yet have methods for development of such criteria. Burkart nonetheless stated that Iowa's nutrient criteria process should include nitrate toxicity. In response to this discussion, Wilton stated that he intends to "stand by my position" that it is not the mission of the nutrient criteria TAC effort to address ammonia and nitrate toxicity issues. As an aside, he noted that Minnesota's proposed acute criterion for nitrate toxicity is 40 mg/l and that the proposed chronic values for warmwater and coldwater aquatic life (~ 4 mg/l for warmwater and ~ 3 mg/l for coldwater) were calculated from the acute value. Dou reiterated that the Iowa DNR WQ Standards Section is the appropriate group through which to pursue to address nitrate toxicity and that the triennial review of WQ standards is the appropriate mechanism to begin looking at nitrate toxicity. Rochelle Weiss (Iowa DNR) added that the WQ Standard Section is currently identifying issues for the upcoming triennial review and that any concerns regarding nitrate toxicity should be forwarded to her for inclusion into the triennial review process.

In response to Mike Burkart's suggestion to better describe the aquatic life that is to be protected by the nutrient criteria, Wilton agreed that some additional explanation is needed in the report. Thus far in the draft nutrient criteria report, indexes of biotic integrity (IBIs) for fish and aquatic macroinvertebrates have been used to characterize aquatic life, and these indexes may seem a bit cryptic to some report readers. Wilton added that biologists have determined that identifying individual indicator species for purposes of WQ protection does not work well. Rather, the use of multi-metric indices has proved to be a more useful and robust approach to protection of aquatic life. One problem with the use of multi-metric indices, however, is that it is more difficult to communicate which species are being protected. Wilton used the example of the role of EPT taxa in the macroinvertebrate index of biotic integrity. That is, the Ephemeroptera, Plecoptera, and Trichoptera organisms are sensitive to pollution impacts and thus are useful for assessing water quality condition, but there is no way to know which of these sensitive organisms is being protected when simply viewing an IBI score. Wilton added, however, that Iowa DNR now has a biological database called BioNet (<https://programs.iowadnr.gov/bionet>) which lists the fish and aquatic macroinvertebrate organisms present at each assessed stream or river site. Wilton said that he has not explained in the report the connection between IBIs and aquatic organisms and the details of IBI impairment thresholds. Burkart responded that the report should include IBI values as targets and that this approach would be helpful for communicating to the public. Wilton said that he would explore this modification to the report and that he has already begun some work on this. He then explained the report does discuss the use of the 25th percentile of reference site IBI scores as an impairment threshold as well as the use of the 75th percentile of the reference site scores as a measure of high-quality biological condition to see whether implementation of numeric nutrient criteria would allow attainment of a higher degree of biological condition.

Mike Burkart continued with questions about the sources of nutrients at reference streams, about what makes a reference stream, and where the reference streams are located. Wilton consulted Figure 2 of the draft nutrient criteria report (*Wadeable stream reference sites (Wilton 2004) and ecological regions of Iowa (Chapman et al. 2004)*) in order to respond to Burkart's questions. Wilton explained that most (~95%) of Iowa's reference streams drain watersheds of from about 10 to 500 square miles and that there are currently about 100 reference sites. The process of reference site selection began in 1994 and included assistance from U.S. EPA geographers. Wilton referred Burkart to the 2004 Iowa DNR report on Iowa's wadeable stream biological assessments (*Wilton T.F. 2004. Biological assessment of Iowa's wadeable streams*) and to an article in the Journal of the Iowa Academy of Science (*Griffith et al. 1994. Ecoregions and subregions of Iowa: A framework for water*

quality assessment and management) on Iowa's ecoregions and reference site selections). The process of reference site selection involved a GIS evaluation of candidate watersheds to avoid point source dischargers and permitted animal feeding operations to the extent possible and to determine whether the candidate reference sites were representative of the area in which they were located. All candidate reference sites were visited by Iowa DNR staff during field reconnaissance surveys to identify any local impacts. Biological sampling of candidate reference sites began in 1994 and has continued on an approximately five-year rotational cycle. Wilton noted that there has been other work on reference site selection that is relevant to Iowa. For example, in the early 2000s, biological monitoring staff from the EPA Region 7 states developed a set of 11 factors to be considered in selecting reference sites. Wilton emphasized that reference site selection is based on more than the results of biological sampling. The biological data are used more to confirm the quality of a reference site after the site has passed the evaluation of other environmental factors.

Continuing with questions on reference sites, Mike Burkart asked if there are reference sites in the headwater category. Wilton responded that there are currently no headwater stream reference sites but that Iowa DNR, in cooperation with the State Hygienic Lab, is in the process of identifying and sampling candidate reference sites on headwater streams. He added that there are a number of environmental and flow-related issues specific to headwater streams. Burkart then asked why the draft nutrient report doesn't deal with headwater streams. Wilton responded that we don't yet have the amount of chemical data and biological data needed to move forward on nutrient criteria recommendations for headwater streams.

Keith Schilling asked about the implications of seasonal nutrient criteria and whether there was any way to annualize the seasonal numbers. Wilton responded that he does see this as an issue. He said that the nutrient criteria recommendations are calibrated to the biological sampling index period and that monitoring outside of the index period, for example in May, would likely further weaken the relationships between the nutrient causal and response variables. Adam Schnieders added that it is difficult to translate in-stream nutrient criteria into permit limits. He said that EPA recognizes this difficulty. It is important to track loads, but this is different from tracking in-stream concentrations.

Mary Skopec asked whether we are protecting for downstream impacts of nutrients. Wilton responded that this is a great point and that EPA wants states to address these downstream impacts. He mentioned that the point source section in the state nutrient reduction strategy includes an example approach incorporating the assessment of loading goals with the assessment of local in-stream nutrient conditions. This type of approach would provide information on whether both the downstream 45% nutrient load reduction goals as well as the local in-stream nutrient response goals are being met. Wilton added that it may be a case of one or the other, and used the example of the streams and rivers in southwest Iowa where large loads of nutrients are moved downstream but nutrients tend not to be expressed as algal growth. Tom Isenhardt says he sees a distinction between nutrient loads early in the year versus export versus nutrient impacts in the summer, and he indicated this has been a difficult message to communicate for the nutrient reduction strategy. Clay Pierce asked "what is the correlation?" Skopec replied that the correlation is "all over the place" and that there is confusion (or lack of focus) on the concept of "downstream impacts"; i.e., does downstream impact refer to the lower reaches of Iowa's large rivers, or does downstream impact refer to Gulf hypoxia?

Connie Dou noted that the diurnal (diel) DO season recommendation (June to September) is different than for existing DO minima water quality standards, which apply throughout the year. She also asked why there is no dissolved oxygen criteria recommendation for coldwater streams

(the coldwater criteria recommendations are shown on PowerPoint Slide 6). Wilton replied that there is currently not enough data to do a meaningful statistical analysis, but that this is an issue that can/should be revisited.

Tom Isenhardt said that he liked the analysis of DO data in the draft report. He asked Wilton for his opinion of the criteria recommendation of a the 5 mg/l DO swing (range). Wilton responded that he is a fan of diel DO monitoring and that Iowa DNR is doing more of this type of monitoring all the time. He said that as more continuous data is obtained, we may be able to refine the 5 mg/l range criterion. He added that Minnesota has proposed a 3 mg/l range, but that this range is too narrow to justify based on Iowa data and thus we are proposing a 5 mg/l range. Isenhardt asked whether the DO range criterion needs to be ecoregion-specific. Wilton responded that, although there is a bit of an ecoregional component in DO levels due to the influence of water temperature on dissolved oxygen, he sees the 5 mg/l range as a good benchmark for the entire state. Isenhardt added that light limitation also can influence DO fluctuations.

Steve Kalkhoff asked whether there is an issue with high levels of dissolved oxygen. He noted that USGS is looking at this issue. Wilton responded that the literature does not suggest a high-DO problem outside of gas bubble disease that can occur in reservoir tailwaters. He added that Minnesota looked at but did not propose a criterion for maximum DO saturation in their stream/river eutrophication criteria. But, he said that we should not ignore the potential for high DO levels to impact the aquatic community, and that we should keep an eye on this issue.

With the time at nearly 12:00 PM and the meeting almost over, Wilton suggested that any observers should send him comments on the draft report. He added that, due to the lack of a specific deadline for finalizing the report, comments could be submitted at any time.

Agenda Item 6: Meeting Conclusion / Next Steps (Wilton):

PowerPoint Slide 13: Next Steps: Wilton discussed the next steps for the nutrient criteria report. He will prepare a summary of responses to the comments received and will then prepare a second draft of the report. After another review by the TAC, he will conduct final editing of the report. Wilton emphasized that he does not see finalizing of the report as the end of the nutrient criteria development process or the end of input from the TAC.

Wilton asked Bill Ehm (Administrator, Iowa DNR Environmental Services Division) if he had any comments. Ehm indicated that we have a ways to go.

Meeting observer Josh Mandelbaum (Environmental Law & Policy Center) asked (1) about the timeline for the criteria development process and the adoption of numeric nutrient criteria and (2) what will it take to keep the process moving forward. Wilton said that he plans to wrap-up the nutrient criteria document as soon as possible (within the next few months). Once the document is finalized, there will be internal Iowa DNR discussions regarding next steps. Wilton asked Bill Ehm (Iowa DNR Environmental Services Division Administrator) if he had anything to add. Ehm indicated that DNR at this time had not identified a firm timeline to complete the report and for DNR to consider the recommendations.

The meeting concluded at noon.